as the rays become harder. This result is in agreement with that given by Mr. Eve. I find also that in hydrogen, in which the ionisation is much less than in air, the ionisation increases relatively to that in air with the increase of hardness of the rays.

The experiments are not quite completed yet, but it is hoped to publish a full account of them shortly.

R. K. McCLUNG.

Cavendish Laboratory, Cambridge, March 12.

Polarisation in Röntgen Rays.

IN a paper on secondary radiation from gases subject to X-rays (*Phil. Mag.* [6] v., p. 685, 1903), I described experiments which led to the conclusion that this radiation is due to what may be called a scattering of the primary X-rays by the corpuscles (or electrons) constituting the molecules of the gas. More recently I have found that from light solids which emit a secondary radiation differing little from the primary, the energy of this radiation follows accurately the same law as was found for gases, so that the energy of secondary radiation from gases or light solids situated in a beam of Röntgen radiation of definite intensity is proportional merely to the quantity of matter through which the radiation passes. Experimental evidence points to a similar conclusion even when metals which emit a secondary radiation differing enormously from the primary are used as radiators, though I have as yet only shown that the order of magnitude is the same in these cases. The conclusion as to the origin of this radiation is therefore equally applicable to light solids, and probably to the heavier metals.

As explained by Prof. J. J. Thomson ("Conduction of Electricity through Gases," p. 268), on the hypothesis that Röntgen rays consist of a succession of electromagnetic pulses in the ether, each ion in the medium has its motion accelerated by the intense electric fields in these pulses, and consequently is the origin of a secondary radiation, which is most intense in the direction perpendicular to that of acceleration of the ion, and vanishes in the direction of that acceleration. The direction of electric intensity at a point in a secondary pulse is perpendicular to the line joining this point and the origin of the pulse, and is in the plane passing through the direction of acceleration of the ion.

If, then, a secondary beam be studied, the direction of propagation of which is perpendicular to that of the primary, it will on this theory be plane polarised, the direction of electric intensity being parallel to the pulse front in the primary beam.

If the primary beam be plane polarised, then the secondary radiation from the charged corpuscles or electrons has a maximum intensity in a direction perpendicular to that of electric displacement in the primary beam, and zero intensity in the direction of electric displacement. Prof. Wilberforce first suggested to me the idea of producing a plane polarised beam by a secondary radiator, and of testing the polarisation by a tertiary radiator.

The secondary radiation from gases is, however, much too feeble to attempt the measurement of a tertiary. From solids I think it will be possible, and hope shortly to make experiments on this.

It occurred to me, however, that as Röntgen radiation is produced in a bulb by a directed stream of electrons, there is probably at the antikathode a greater acceleration along the line of propagation of the kathode rays than in a direction at right angles; consequently, if a beam of X-rays proceeding in a direction perpendicular to that of the kathode stream be studied, it should show greater electric intensity parallel to the stream than in a direction at right angles.

I therefore used such a beam as the primary radiation, and studied by means of an electroscope the intensity of secondary radiation proceeding from a sheet of paper in a direction perpendicular to that of propagation of the primary beam.

By turning the bulb round the axis of the primary beam studied, the intensity of this beam was not altered, but the intensity of the secondary beam was found to reach a maximum when the direction of the kathode stream was perpendicular to that of propagation of the secondary beam, and a minimum when these two were parallel.

In one series of experiments the intensity of secondary radiation in a direction perpendicular to that of the primary beam was compared with that in a direction making a small angle with the axis of the primary beam. The latter, according to theory, should not vary with the position of the X-ray bulb.

In a second series of experiments the intensity of secondary radiation in a direction perpendicular to the axis of the primary beam was compared with that of a small portion of the primary beam itself, when the bulb was in different positions.

Lastly, the intensity of secondary radiation was measured in two directions perpendicular to that of propagation of the primary radiation and perpendicular to each other, while the intensity of the primary beam was measured by a third electroscope.

The three methods gave similar results.

In the last case, as the bulb was turned round as described, one secondary beam reached a maximum of intensity when that at right angles attained a minimum. When the bulb was turned through a right angle the former produced a minimum of ionisation while the latter produced a maximum.

Two bulbs were used and the sizes of the apertures were varied, but the results were similar in all cases.

The variation of intensity of the secondary beam amounted to about 15 per cent. of its value, but this, of course, does not represent the true difference, as beams of considerable cross section were studied, consequently secondary rays making a considerable angle with the normal to the direction of propagation of the primary rays were admitted into the electroscope.

The experiments are being continued.

These results, however, are in agreement with the theory, and I think show conclusively that the X-radiation proceeding from a bulb is partially polarised.

CHARLES G. BARKLA.

University of Liverpool, March 10.

The British Government and Marine Biology.

IN a note in your issue of February 25 announcing the appointment of Mr. James Hornell, who, it is stated, acted as Prof. Herdman's assistant during the Ceylon pearl oyster investigation, to the post of marine biologist to the Government of Ceylon and inspector of the pearl banks, it is said that "the appointment is of interest as showing how in the recognition of science some of our colonies are in advance of the mother country. We have no 'marine biologist to the Government' here."

Now although the latter statement may be verbally accurate, it appears to me to be misleading, and one would seem to be justified in supposing that it has been made without full knowledge of the facts.

At the present time the British Government is committed to an expenditure of 42,000*l.*, to be spread over a period of three years, for the purpose of carrying out the British portion of the international fishery investigations, the programme of which, conceived in an eminently scientific spirit, has been drawn up by an international council comprising amongst its members some of the most distinguished of European marine biologists. In addition to this the Government has made for a number of years, and still continues to make, a grant of 1000*l.* a year to the Marine Biological Association, the declared object of which is the promotion of both scientific and economic marine biology; public money has been spent on scientific fishery investigations in both Scotland and Ireland, and the Government has quite recently appointed Dr. A. T. Masterman, a well known and capable marine biologist, to the post of inspector of fisheries.

To decline to acknowledge what is already being done is surely not the way to obtain increased support for scientific investigations in the future. E. J. ALLEN.

Marine Laboratory, Plymouth.

THE brief statement contained in the note was quite correct, and although it might be expanded and illustrated, it needs no qualification. We were well aware of all the facts stated by Dr. Allen.

The fact that the British Government has given a considerable grant for a limited and short period in order to meet part of the expense of an international fishery investigation does not, unfortunately, enable us to claim that we have a "marine biologist to the Government." The Government gives various grants to enable special pieces of scientific work to be carried out, but that does not constitute the recipients Government officials.

Dr. Allen reminds us that a marine biologist has been recently appointed inspector of fisheries. Fortunately that is no new thing. The list in the past includes Huxley and Frank Buckland, and we hope that all our inspectors of fisheries are competent biologists—but they are H.M.'s "Inspectors of Fisheries."

The Government grant to the Marine Biological Association goes to no Government official. The cover of the current number of the *Journal* of the Marine Biological Association announces that "The Association owes its existence and its present satisfactory condition to a combination of scientific naturalists, and of gentlemen who, from philanthropic or practical reasons, are specially interested in the great sea-fisheries of the United Kingdom." This is no Government institution.

One of the conditions attached to the annual grant from the Treasury was that space at the Plymouth Laboratory should be placed at the disposal of any competent investigator deputed to carry out investigations into fishery questions. None of the Government fishery departments (England, Scotland, Ireland) have, however, availed themselves of this condition. Where, then, is the "Government marine biologist"? THE WRITER OF THE NOTE.

Learned and Unlearned Societies.

MR. BASSET'S letter (p. 437) is of importance in giving authoritative evidence of what goes on behind the scenes. It was only a matter of suspicion with me that the benevolent rejectors sometimes knew even less about the subjects of the papers than the authors themselves. But the remedy proposed by Mr. Basset is, I fear, a very unsatisfactory one. Just the same sort of thing can and does occur elsewhere. The only right and proper course seems to be that indicated by Mr. Buchanan. It would be enormously to the advantage of an old-established institution, and to its members, even though there might sometimes be some counteraction by the admission of poor matter. But it is not necessary to repeat here Mr. Buchanan's argument, which was very strong and full of common sense. OLIVER HEAVISIDE.

March 13.

A Plea for Good English.

I BELIEVE the phrase that "language was given us to conceal our thoughts" only holds good in diplomacy, and it may therefore be reasonably expected that a professor of science should endeavour to teach his pupils to express themselves in clear, concise and literary English. The German language lends itself to a process known as word-building, and for aught I know to the contrary, the word "Schwefelkohlenstoff" may be good, literary German. But this process is altogether foreign to the genius of the English language, and I cannot imagine a more barbaric or misleading conglomeration of verbiage than the phrase "chalk-stuff-gas." Chalk is popularly associated with lime, or, to speak more accurately, with calcium, and to call a substance "chalk-stuff-gas" which does not contain an atom of calcium appears to me a misuse of language, especially as CO_2 can be prepared in various ways without using any substance containing calcium, or what is popularly known as "chalk" or "lime." It seems to me that it would be difficult to invent a more suitable phrase than "carbon dioxide," since it expresses in terse and pointed language the chemical composition of the gas.

Alassio, March 9. A. B. BASSET.

Zoological Nomenclature.

ON p. 200 of your issue of December 31, 1903, just arrived, in a review by "W. T. B." I note an allusion to my "curious illustrations of zoological nomenclature," and it is stated that my "new name" (which, by the way, was proposed in 1899!) "is given to a genus the type of which appears, according to the rules of Linnæus himself, to be also the type of the Linnæan genus Cimex."

Where, sir, are these "rules of Linnæus himself" in which the fixation of types is set forth? I was under the impression that we were indebted to Fabricius for these indispensable aids to zoological nomenclature, and I would be grateful for the reference to Linnæus.

Your reviewer's remark on Cimex contains an error; "lectularius" is not and cannot be the type of Cimex, Linn., (1) because it does not conform to the description of that genus as set forth by the founder. Moreover, if the type be worked out historically, "lectularius" is equally invalid; the first discerptor was Fabricius, who, in a perfectly straightforward manner, removed our species from Cimex to form a part of his new genus Acanthia. This effectively prevents lectularius from ever appearing as the type of Cimex, and it is a fact well known to the students of the Rhynchota.

Further, lest it might be thought that the proper generic name of lectularius is Acanthia, let me mention that in 1797 Latreille restricted the latter to "littoralis" and its congeners, and "lectularius" was again shut out, the way that, so far as my knowledge then went, I was justified in proposing a new name. However, since then I have acquired a somewhat rare book, the "Hemiptera Sueciæ" (1829), the authorship of which is usually ascribed to Fallén, but is mentioned as Johannes Petersson for p. 141, where "Clinocoris" is proposed, and I willingly, and, indeed, inevitably, retire in favour of this for the unfortunate and so long homeless "bed-bug." My previous ignorance of this was shared apparently by everyone since the first announcement of the name (as applied to lectularius).

With regard to the "curious illustrations of zoological nomenclature," I would refer "W. T. B." to the witty and able "Zoological Nomenclature. Remarks on the Proposed International Code," by T. R. R. Stebbing, in the *Zoologist* for October 15, 1898, 2, pp. 423–8. As the reverend karkinologist remarks, "no possible harm is done if we do leave to the polished scholar some little occasion for chuckling over us untutored sons of science."

G. W. KIRKALDY.

Department of Agriculture, Honolulu, H.I., January 26.

MR. KIRKALDY'S remarks about the type of the Linnæan genus Cimex are a quibble, to which it is sufficient reply to point out that in the passage which he quotes and attempts to ridicule it was not stated that *Cimex lectularius* was made the type of the genus by Linnæus.

Although the selection of one species of each genus as the type is of later date than Linnæus, several of the Linnæan genera are clearly founded on a particular species in each case. Thus, to take familiar forms, Equus is named from the horse, and it is therefore correct to say that *E. caballus* is the type of the Linnæan genus Equus. Similarly *Bos taurus* is the type of Bos, and *Canis familiaris* of Canis. Similar cases are rare amongst invertebrate animals, but Cimex is an exception, for the generic name was taken from a species in the Linnæan genus that was called Cimex in classical Latin. The only species that can be clearly identified with the Latin name appears to be *C. lectularius*, Linn.

This, however, has been disputed—what opinion has not?—by a few amongst the very many writers who have treated the question of Cimex and Acanthia, so another reason may be given for regarding *C. lectularius* as the type of Cimex. The rule of Linnæus, quoted below, was that if a genus be divided, the commonest and best known species should be retained under the original generic name. There can be no question that *C. lectularius* is by far the best known species of the genus.

The "rules of Linnæus himself" were printed in his "Philosophia Botanica," and quoted by Agassiz in the introduction to the "Nomenclator Zoologicus." These rules have always been regarded as authoritative by both botanists and zoologists, and should in any case be consulted when Linnæan genera and species are concerned. The two following rules apply in the present case:—

242. *Nomen genericum* Antiquum *antiquo generi convenit.*

246. *Si genus receptum, secundum jus naturae et artis*